

What is claimed is:

1. A spring fastener comprising a first side and a second side opposite the first side, the first side connected to the second side thereby forming a U-shaped structure having a cavity between the first side and the second side, a bottom portion wherein the first side and the second side are connected, and a top portion, the first side comprising first barbs having first front ends, and a first engagement spring, the first engagement spring connected to the first side in the vicinity of the bottom portion, the second side comprising second barbs second front ends, and a second engagement spring, the second engagement spring connected to the second side in the vicinity of the bottom portion, each of the first and second engagement springs having an optional recess and a free end in the vicinity of the top portion, each spring also comprising a peak and an engagement region with a hindrance portion between the optional recess, or the free end in the absence of recess, and the peak, the hindrance portion comprising one structure selected from ripple, side rib, upward solid bent extension parallel to the peak and the recess, or the free end in the absence of recess, knurled region, bent teeth, each having a depth, and a combination thereof, and providing increased removal force, when the fastener is pulled by a rib of a first part engaged to the first and second barbs, after the fastener has been inserted into a slot of a second part, the slot having a slot width and edges on which edges the engagement region is engaged, the increased removal force being due to the hindrance portion, and wherein the fastener can be extracted when pulled by the rib without damage to said fastener.

2. A spring fastener as defined in claim 1, wherein the depth of the ripple, the side rib, the upward solid bent extension which is parallel to the peak, the knurled region, and the bent teeth is smaller than 0.2 mm.

3. A spring fastener as defined in claim 1, wherein each ripple has the form of a depression, the depression having a deepest part, a front side, a back side and a width, and the hindrance portion has a surface, comprises not more than three ripples, and

wherein the depth of each ripple is the distance between the surface of the hindrance portion and the deepest part of the respective ripple.

4. A spring fastener as defined in claim 3, wherein hindrance portion
5 comprises not more than two ripples.

5. A spring fastener as defined in claim 4, wherein the hindrance portion comprises only one ripple.

10 6 A spring fastener as defined in claim 5, wherein the ripple width is larger than the depth of the ripple.

7. A spring fastener as defined in claim 6, wherein the ripple width is at least twice the size of the depth of the ripple.

15 8. A spring fastener as defined in claim 6, wherein the ripple width is in the range of 0.1 to 0.5 mm and the ripple depth is in the range of 0.01 to 0.1 mm.

20 9. A spring fastener as defined in claim 3, wherein the back side has a slope in the range of 15 to 30 degrees with regard to the general plane of the hindrance portion.

10. A spring fastener as defined in claim 3, wherein the front side has a higher slope than the back side.

25 11. A spring fastener as defined in claim 5, wherein the ripple has only a back side, substantially lacking a front side.

30 12. A spring fastener as defined in claim 11, wherein the back side has the form of a curvature with a gradually decreasing slope.

13. A spring fastener as defined in claim 12, wherein the gradually decreasing slope has the shape of an arc in the range of 50-70 degrees with a radius in the range of 0.03 -0.05 mm.

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14. A spring fastener as defined in claim 1, wherein the barbs are selected from a group consisting essentially of :

first barbs being outer barbs and second barbs being inner barbs;

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first barbs being outside outer barbs and second barbs being inside outer barbs; and

first barbs being inner barbs and second barbs being inner barbs.

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15. A spring fastener as defined in claim 3, wherein the barbs are selected from a group consisting essentially of :

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first barbs being outer barbs and second barbs being inner barbs;

first barbs being outside outer barbs and second barbs being inside outer barbs; and

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first barbs being inner barbs and second barbs being inner barbs.

16. A spring fastener as defined in claim 11, wherein the barbs are selected from a group consisting essentially of :

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first barbs being outer barbs and second barbs being inner barbs;

first barbs being outside outer barbs and second barbs being inside outer barbs; and

5 first barbs being inner barbs and second barbs being inner barbs.

17. A spring fastener as defined in claim 12, wherein the barbs are selected from a group consisting essentially of :

10 first barbs being outer barbs and second barbs being inner barbs;

first barbs being outside outer barbs and second barbs being inside outer barbs; and

15 first barbs being inner barbs and second barbs being inner barbs.

18. A spring fastener as defined in claim 14, wherein at least one barb is cut from its respective side, flexible, and bent at its respective front end.

20 19. A spring fastener as defined in claim 15, wherein at least one barb is cut from its respective side, flexible, and bent at its respective front end.

20. A spring fastener as defined in claim 16, wherein at least one barb is cut from its respective side, flexible, and bent at its respective front end.

25 21. A spring fastener as defined in claim 17, wherein at least one barb is cut from its respective side, flexible, and bent at its respective front end.

22. A spring fastener as defined in claim 14, wherein the material from which the spring fastener has a thickness, and the front points of the outside outer barbs are at a distance from the second side smaller than the thickness of said material.

5 23. A spring fastener as defined in claim 17, wherein the material from which the spring fastener has a thickness, and the front points of the outside outer barbs are at a distance from the second side smaller than the thickness of said material.

10 24. A spring fastener as defined in claim 21, wherein the material from which the spring fastener has a thickness, and the front points of the outside outer barbs are at a distance from the second side smaller than the thickness of said material.

15 25. A spring fastener as defined in claim 1, wherein the fastener has a width in the vicinity of the top portion of the fastener which is at least 60% as wide as the slot width.

26. A spring fastener as defined in claim 1, wherein the engagement region is at least partially wider than the rest of the engagement spring.

20 27. A spring fastener as defined in claim 3, wherein the engagement region is at least partially wider than the rest of the engagement spring.

28. A spring fastener as defined in claim 11, wherein the engagement region is at least partially wider than the rest of the engagement spring.

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29. A spring fastener as defined in claim 12, wherein the engagement region is at least partially wider than the rest of the engagement spring.

30. A spring fastener as defined in claim 1, further comprising additional lower barbs pointing inwardly and originating from the vicinity of the bottom portions of the first side and the second side of the fastener.

5 31. A spring fastener as defined in claim 1, wherein each side of the spring fastener has only one upper barb and one lower barb, the upper barb of one side facing the lower barb of the other side and vice versa.

10 32. A spring fastener as defined in claim 1, further comprising a relief opening in the vicinity of the bottom of the spring fastener.